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# Macroeconomic Prospects for China's Outward FDI

Ilan Alon<sup>\*</sup>, Tanya Molodtsova<sup>\*\*</sup> and Jian Zhang<sup>\*\*\*</sup>

**Abstract:** We present evidence from panel data on overseas foreign direct investment (OFDI) by Chinese firms in 103 countries during 2003-2007. The data suggest that Chinese imports, unlike Chinese exports, stimulate investment in the country of origin. This article supports the theory that Chinese investment abroad is horizontal and designed to serve the Chinese local market (import platform investment). Estimates suggest that a 1% change in imports from China will lead to a 0.15% change in Chinese OFDI. We also find that an appreciation of the Chinese exchange rate will have a strong influence on firm entry decisions.

**Keywords:** China, international trade, OFDI, exchange rate, gravity model

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## 1. Introduction

China is one of the largest traders and biggest economies in the world, but its investment abroad is still minimal in relation to its global GDP. Despite the 2008 global financial crisis, Chinese companies have accelerated their purchases of assets throughout the world. However, the motivations and activities of Chinese enterprises investing abroad are still mysteries for most developed countries.

China's OFDI is not only small globally but also compared with other investment items. In 2008, of a total FDI of US\$170 billion, about 8 percent was for China's foreign reserves, 20 percent was for inward FDI (Rosen and Hanemann, 2009), 12 percent was for merchandise trade exports, and 15 percent was for merchandise trade imports (Zhang, 2010). OFDI represents only about 5 percent of China's total international investment, although it is expected to grow significantly in the years to come.

Given the growing importance of Chinese capital in global markets and the political tensions that it generates, there is an urgent need to study the determinants of Chinese investment (Alon and McIntyre, 2008). In this paper, we ask "What are the macroeconomic factors that determine China's outward investment?" and "What are the factors that affect the investment decisions by Chinese firms?" In particular, we will contribute to the literature by examining the role of trade in these decisions. Chinese currency has been a key topic in recent economic debates in both political and academic fields, and changes in the exchange rate will have an influence on trade and investment. It is a vexing challenge for developing countries, where trade deficits have increasingly grown in recent years, to balance their international payments with China. For those countries, Chinese investment may offer some relief. On the other hand, for the Chinese, it is not a simple task to achieve an optimal investment portfolio that minimizes risks and expands returns. Thus, an understanding of the macroeconomic determinants of

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Chinese investment and its interplay with trade is relevant to international economic policy for both China and its trade partners.

This paper contributes to the literature on the globalization of Chinese firms by using an augmented gravity model to assess the macroeconomic factors driving investment activities abroad by Chinese firms. Particularly, we test the relationship between trade and investment by Chinese firms. Previous research is divided over the impact of trade on investment, with some works showing a positive impact of trade on investment and others finding evidence of a tradeoff. Policy makers often favor a trade surplus and positive inward investment flows, which have the potential to improve the balance of payments and GDP. Given that China runs a trade surplus with many developed countries, the relationship between trade and investment also has important policy implications.

The literature on modeling Chinese outward foreign direct investment using sophisticated econometrics is still in its infancy. In part, this is because the novelty of Chinese outward investment has not allowed mature research (Alon et al., 2009). Much of the available research on Chinese investment to date focuses on inward flows. Early papers on OFDI from China, such as Carstensen and Toubal (2004), Cheng and Stough (2007), and Hong and Sun (2006), are descriptive in nature and focus mainly on documenting the patterns of foreign direct investment.

However, there are several notable exceptions. Cheng and Ma (2007) and Buckley et al. (2007) use gravity-like models in which the host countries' GDP and the geographical distance determine Chinese outward foreign direct investment flows. Buckley et al. (2007) argue that outward foreign direct investment from emerging countries requires a special theory nested within the mainstream theory. They claim that capital market imperfections, the ownership advantages of Chinese multinational enterprises, and institutional factors can explain OFDI from China. Liu et al. (2005) suggest that economic development has a direct impact on OFDI expansion and institutions have an indirect effect. Cheung and Qian (2009) suggest that there are different determinants of OFDI for investments from the developed and developing countries. Resource seeking is one of the most important determinants of OFDI from the developing countries. Modeling Chinese OFDI enables a comparison with that of the developed countries, thus testing the boundaries of traditional gravity models from developed markets.

Unfortunately, the scant available research utilizing gravity models to explain Chinese investment suffers from data problems. These studies often rely on Chinese administrative data, which are provided by the Chinese Ministry of Commerce (MOFCOM) and the State Administration of Foreign Exchange (SAFE). The accuracy of China's aggregate OFDI data is questionable. MOFCOM data does not fully comply with internationally FDI standards, including the OECD's benchmark definition of Foreign Direct Investment (OECD, 2008a) and the IMF's Balance of Payments Manual.<sup>1</sup> Rosen and Hanemann (2009) note that there is a number of reasons why the MOFCOM methodology for OFDI data collection is opaque. The problems are related to the data collection methods that require firms to register their investment projects at local commerce bureaus, sidestepping international standards. Many Chinese firms do not report foreign earnings that are reinvested abroad and "round-tripping" is common. "Round-tripping" is a strategy to report OFDI (mostly to Hong Kong or tax havens) with the purpose of bringing it back to China and enjoying preferential FDI treatment. Some analysts estimate that round-tripping may account for more than one-third of all inward FDI flows. The unreliability of information at the final OFDI destination is also an important limitation of aggregate China OFDI statistics, which are crucial to a study of the determinants of OFDI across host countries. Because Chinese firms tend to report stopover locations instead of final destinations, up to 80 percent of the MOFCOM OFDI is in Hong Kong or other tax havens. It is difficult to put correct weights on each of these factors and to decide the sign and

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<sup>1</sup> For more information on the consistency between China's FDI statistics and international standards, see OECD (2008b).

magnitude of the bias in the aggregate OFDI statistics. Our analysis is free of this problem because it relies on direct survey data obtained from individual firms by an independent agency.

## **2. Trade and FDI: Substitutes or Complements**

Many studies on FDI to and from the developed economies focus on whether FDI flows and trade are complementary or are substitutes. In contrast, this question has not been addressed for the developing countries in general and for China in particular.

Research on the developed markets suggests that the answer to this question depends on whether FDI is mostly vertical or horizontal. Vertical FDI usually refers to the establishment of local production for local sales, whereas horizontal FDI refers to the establishment of international production for cost minimization. In the United States, for example, evidence suggests that horizontal FDI dominates vertical FDI, with foreign affiliates exporting back only about 15 percent of their output (Markusen, 2003). In the enlarged European Union context, Brouwer et al. (2008) find complementarity between trade and investment. Trade and investment move concurrently, suggesting horizontal connections. Models of a proximity-concentration tradeoff assume that FDI is horizontal and a trade substitute, since higher trade costs make it more profitable for firms to accept the one-time fixed costs associated with FDI and to engage in local sales instead of exporting to local markets. Market-seeking investments are horizontal in nature.

There are also other forms of horizontal investment. For example, export-platform FDI suggests that a firm uses investment to serve both the host market and its neighbors. Blonigen et al. (2004) find evidence that shows that FDI from the United States to individual European countries increased as the income of the neighboring economies increased, suggesting that in this context trade and horizontal FDI may be substitutes.

Vertical FDI is said to be determined by cost differences. Neary (2009) shows that lower tariffs in the host country discourage vertical FDI and encourages exports. Lower tariffs in the source country encourage vertical FDI by reducing the costs of exporting back to the home country of the parent firm. Thus, vertical FDI and trade tend to be complementary.

The issue of whether and how trade affects investment from China is still understudied. If vertical FDI and export-platform FDI are a minor part of FDI from China, then trade and OFDI will be substitutes. If, however, export-platform FDI represents the main part of horizontal FDI from China, then trade and FDI will be complementary.

Both vertical and horizontal FDI theories link trade to OFDI. By examining trade, our paper provides an indication of whether trade from China complements or substitutes for investment, and whether there is evidence of horizontal or vertical FDI from China. To test this, we include in our model exports from China to the host country and imports from the host country to China. Disaggregating trade by exports and imports separately, we can examine the more intricate relationships. For example, a positive relationship between Chinese exports and outward investment flows may exist if the newly-established firms are used to buy Chinese intermediate goods for sale in the local market. Conversely, if a positive association exists between imports and OFDI, newly formed firms may be used to acquire assets that will be used back home. Resource-seeking investments are likely to follow that pattern.

Examining the relationship between trade and investment from China is instructive both theoretically and practically. Because Chinese assets are often state-controlled, there is mixed ownership in the Chinese economy. Government action is often considered exogenous in economic analyses. If Chinese investment

behaves much in the same way as foreign investment from other more market-oriented economies, then fears of Chinese ownership of local assets may be partially alleviated.

An examination of the characteristics Chinese OFDI in the next section provides the context for our empirical examination.

### 3. Gravity Model for Chinese OFDI

The seminal work by Anderson (1979) provides a theoretical micro-foundation for the gravity equation. The gravity model is widely used to analyze international trade and investment flows (Markusen, 1984; Frankel and Romer, 1999; Feenstra et al., 2001; Markusen, 2002; Dollar and Kraay 2003; Rose, 2004; Yu, 2010; Wang et. al. 2010). Typical independent variables include GDP, GDP per capita, currency, physical capital, human capital, distance, country size, location, language, political system, cultural, religion, and so forth. Bergstrand and Egger (2004) extend Markusen's (2002) knowledge-capital model to include physical capital. Helpman (1984) and Helpman et al. (2007) introduce general equilibrium models to the gravity model. Building on the works of Helpman (1984) and Markusen (1984), Carr et al. (2001) solve a 47-equation, general equilibrium model incorporating vertical and horizontal FDI. These studies suggest linear FDI equations with key variables enter with interactions to capture non-linearities in the model.

In this paper, we use the standard gravity model, as suggested by Markusen (2002). The gravity equation determines the FDI flow from country  $i$  (China) to country  $j$  in year  $t$  as follows:

$$FDI_{ijt} = \frac{GDP_{it} GDP_{jt}}{GDP_t^W} \quad (1)$$

where  $GDP_{it}$  is the GDP of the country of origin,  $GDP_{jt}$  is the GDP of the destination country, and  $GDP_t^W$  is global GDP. In log-linear form, equation (1) becomes

$$\ln(FDI_{ijt}) = \ln GDP_{it} + \ln GDP_{jt} - \ln GDP_t^W \quad (2)$$

Specification (2) is typically augmented to include various proxies for bilateral investment costs, such as the time-invariant distance between the two countries ( $DIST_{ij}$ ), a dummy variable for a common language ( $LANG_{ij}$ ), a common border ( $BORDER_{ij}$ ), whether or not the destination country is landlocked ( $LANDLOCK_j$ ), and physical size of the destination country ( $AREA_j$ ).

The standard baseline gravity equation can be altered algebraically to separate economic size and similarities:

$$FDI_{ijt} = \frac{GDP_{it} GDP_{jt}}{GDP_t^W} = \frac{(GDP_{it} + GDP_{jt})^2 s_{it} s_{jt}}{GDP_t^W} \quad (3)$$

where  $s_{it} = GDP_{it} / (GDP_{it} + GDP_{jt})$ . When countries  $i$  and  $j$  are identical in size ( $s_{it} = s_{jt} = 1/2$ ),  $s_{it} s_{jt}$  is at a maximum. In log-linear form, equation (3) becomes

$$\ln(FDI_{ijt}) = 2 \ln(GDP_{it} + GDP_{jt}) + \ln(s_{it} s_{jt}) - \ln GDP_t^W \quad (4)$$

Ignoring the logs, the following is a simple gravity model equation:

$$FDI_{ijt} = \alpha + \beta_1 GDP_{it} + \beta_2 GDP_{jt} + \beta_3 Language_j + \beta_4 Border_j + \beta_5 Distance_j + \beta_6 Area_j + u_{ijt} \quad (5)$$

where *Language* and *Border* are dummy variables indicating whether China shares a common official language or border with host country *j*, *Distance* is the log of simple distances calculated using the great circle formula, and *Area* is the log of the area of host country *j* in square feet.<sup>2</sup>

We augment the standard gravity model equation (5) with several additional variables that allow the relationship between investment and trade, as well as exchange rate changes and other macroeconomic variables that are deemed relevant in previous studies. These variables are controlled for in the model to minimize mis-specifications and to provide a richer explanation for Chinese OFDI.

### 3.1 Exchange Rate Change and FDI

Empirical evidence on the effect of exchange-rate change on FDI is mixed. Froot and Stein (1991) find that a depreciation in the domestic currency can decrease the relative wealth of domestic firms and reduce their ability to engage in mergers and acquisitions. Thus, in vertical FDI models, a depreciation of the home currency leads to a reduction in incentives to undertake FDI. However, hysteresis models, for example Dixit (1992), consider the possibility of an asymmetric response by FDI to exchange-rate movements. Exchange-rate depreciation in the home country is expected to increase the entry of firms, whereas an exchange-rate appreciation will not necessarily lead to exits.

In order to model this asymmetry, we introduce two additional variables (*ER Appreciation* and *ER Depreciation*), which are equal to the exchange-rate change if it is positive (negative) and zero otherwise. Since the exchange-rate change is defined in terms of the host country currency per unit of the Chinese renminbi, a positive exchange-rate change indicates an appreciation in the Chinese currency. If hysteresis theory holds for China, an exchange-rate depreciation of the home currency is expected to have a positive and significant sign.

### 3.2 Interest-Rate Differential and FDI

The interest rate differential measures the relative cost of loans in the two economies. If firms in a foreign country have easier access to credit than firms in China and the interest rate differential is positive, there will be an incentive for Chinese firms to invest in this market. Thus, we expect the sign on the interest-rate differential to be positive.

### 3.3 Skilled-Unskilled Ratio and FDI

Following Markusen (2002), we use the ratio of skilled-to-unskilled labor in the host country to that in China. Skilled labor is proxied by the number of laborers with a tertiary education per 100 people, and unskilled labor is measured by the number of laborers with a primary education per 100 people. If Chinese firms tend to invest more in countries where the proportion of skilled-to-unskilled labor is relatively greater than that in China, then we expect to see a positive and significant coefficient for this variable. Investments that seek know-how (strategic assets) may be attracted to a high skilled to unskilled labor ratio.

### 3.4 Inflation, Capital Mobility, and Internet Penetration Similarities and FDI

Inflation similarities are measured in the same way as GDP similarities in equation (3). A positive and significant sign for inflation similarities would indicate that Chinese investors prefer countries with a similar inflation rate.

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<sup>2</sup> The dummy variables for whether the two countries share the same religion and whether the host country is landlocked are not found to be significant in any of the specifications and therefore are eliminated from our analysis.

In addition to trade openness, OFDI activity can be related to financial openness or capital mobility in the host country. We use the measure of capital mobility proposed in Chinn and Ito (2008). If Chinese firms tend to invest in countries with a similar capital mobility, we expect the coefficient for capital mobility similarity to be positive and significant.

To take into account technological differences across countries, we introduced similarities in Internet penetration between China and a foreign country, where Internet penetration is measured as the number of Internet users per 100 people. If Chinese firms tend to invest in countries with similar levels of technological development, we would expect that the coefficient for Internet penetration similarity to be positive and significant.

Taking the above-specified variables into account, the augmented gravity model equation (5) is as follows:

$$\begin{aligned} FDI_{ijt} = & \alpha + \beta_1 GDP_{it} + \beta_2 GDP_{jt} + \beta_3 Language_j + \beta_4 Border_j + \beta_5 Distance_j + \\ & \beta_6 Area_j + \beta_7 ERChange_{jt} + \beta_8 Exports_{jt} + \beta_9 Imports_{jt} + \beta_{10} Idiff_{ijt} + \\ & \beta_{11} InflationSim_{ijt} + \beta_{12} SURatio_{ijt} + \beta_{13} KAOPENS_{ijt} + \beta_{14} InternetSim_{ijt} + u_{ijt} \end{aligned} \quad (6)$$

where ERChange is the percentage change in the nominal exchange rate between the host country currency and the Chinese renminbi, Exports is the log of exports from China to host country j, Imports is the log of imports from host country j to China, Idiff is the difference between the short-term interest rate in China and that in host country j, InflationSim is similarities in inflation rates in China and host country j calculated by using the same approach that calculates GDP similarities, SURatio is the ratio of skilled-to-unskilled labor in the host country to that in China, InternetSim is a measure of Internet access similarities as the number of Internet users per 100 people, and KAOPENSim is a similarity in financial openness. The measure for financial openness is taken from Chinn and Ito (2008).

Possible nonlinearities in gravity model equation (6) have been documented in previous empirical work. To take into account possible nonlinearities, we include interaction terms in equation (6) to obtain the following augmented gravity equation:

$$\begin{aligned} FDI_{ijt} = & \alpha + \beta_1 GDP_{it} + \beta_2 GDP_{jt} + \beta_3 Language_j + \beta_4 Border_j + \beta_5 Distance_j + \beta_6 Area_j + \\ & \beta_7 ERChange_{jt} + \beta_8 Exports_{jt} + \beta_9 Imports_{jt} + \beta_{10} Idiff_{ijt} + \beta_{11} InflationSim_{ijt} + \beta_{12} SURatio_{ijt} + \\ & \beta_{13} KAOPENS_{ijt} + \beta_{14} InternetSim_{ijt} + \beta_{15} Exports * ERChange + \beta_{16} SURatio * Idiff + \\ & \beta_{17} KAOPENS * Idiff_{ijt} + \beta_{18} SURatio * KAOPENS_{ijt} + u_{ijt} \end{aligned} \quad (7)$$

Equations (5)-(7) are estimated using a pooled OLS regression with HAC robust standard errors. We cannot estimate gravity model equations with fixed effects because of the relatively small sample size. Introducing 103 host country dummies with only 515 observations does not seem feasible.

#### 4. Data and Characteristics of China's OFDI

We use panel data from 2003 to 2007 on outward FDI from China to 103 host countries. The data are taken from the *FDI Intelligence Database* of the *Financial Times LTD*. The database tracks an estimated 95 percent of all major global FDI projects, as well as 80 percent of smaller FDI projects and it is considered the most comprehensive source of FDI information.

Although the availability of Chinese data on cross-border investment has improved significantly over the last decade, the accuracy of the data sources remains a serious concern. The main source of official statistics on Chinese OFDI is the *Annual Statistical Bulletin on China's Outward Direct Investment* compiled by the Chinese Ministry of Commerce and co-published by the State Administration of Foreign Exchange and the National Bureau of Statistics (NBS). Secondary sources for OFDI data are *China's Balance of Payments* (BOP) and *International Investment Position* (IIP), both published by the SAFE. As noted in the introduction, aggregate statistics on Chinese OFDI are riddled with problems. Since our data are based on a direct survey and are collected by an independent agency, we have a more accurate picture of the OFDI intentions of Chinese companies.

The main variables of interest, China's exports to the host countries and imports from the destination countries to China, are taken from the International Monetary Fund's *Direction of Trade Statistics*.

Standard time-invariant gravity model regressors, such as distance and dummy variables indicating whether the two countries are contiguous or share a common language, are taken from the CEPII Database (see [www.cepii.fr](http://www.cepii.fr)). There are two common language dummies in the dataset. The first is based on the fact that the two countries share a common official language, and the other is set as one if a language is spoken by at least 90 percent of the population in both countries. Since these two measures of common language produce the same series, we choose the series that represents official language in both countries. The simple distances are calculated following the great circle formula, which uses the latitude and longitude of the most important city (in terms of population) or the official capital.

The nominal exchange rate is defined as the end-of-the-year national currency price of a unit of Chinese currency. It comes from the IMF *International Financial Statistics*. Defined in this way, a positive exchange-rate change means an appreciation of the Chinese renminbi relative to the currency of the destination country. The short-term interest rate is measured using the money-market rate or the interbank rate for most countries and is taken from the IMF *International Financial Statistics*. Inflation is calculated as the 12-month difference in the consumer price index and is taken from the IMF *International Financial Statistics*. The skilled-to-unskilled ratio between host country *j* and China is measured as the ratio of those laborers with a tertiary education per 100 people to those with a primary education per 100 people in host country *j* divided by a similar ratio in China. Internet access is used to measure the level of technological development and is measured as the number of people with Internet access per 100 people. These variables are taken from the World Bank *World Development Indicators* database. The measure for financial openness is taken from Chinn and Ito (2008).

Although China plays a minor role as a global investor, with average Chinese FDI outflows between 2000 and 2007 accounting for less than 1 percent of global flows, China is likely to play a more significant role in the coming years. First, China's growing economic size, rapid economic growth, and larger external surpluses are likely to support the accumulation of significant external assets. Second, China's "catch-up" potential is significant. Despite a high growth rate of 65 percent in China's OFDI between 2002 and 2008, China's outward FDI stock and flows are still low as a share of GDP and as a share of total external assets. In 2007, China's FDI stock amounted to a mere 3 percent of GDP, compared to Brazil's 10 percent and Russia's 20 percent. Third, in recent years the Chinese government has liberalized regulations governing outward FDI flows and has streamlined bureaucratic procedures. The government offers various incentives for Chinese companies seeking to invest overseas as part of its "going global" policy. Finally, China has strategic incentives to support outward FDI as its dependence on commodities has increased significantly during the past few years.

China's OFDI flows are also characterized by a pronounced countercyclical behavior. In 2008, global FDI flows fell by about 20-30 percent, whereas outward FDI from China almost doubled (see Figure 1 for descriptive statistics). Based on the above features, this upward trend is expected to persist in the future.



### **Insert Figure 1 About Here**

China's OFDI flows have a high growth rate, with mergers and acquisitions constituting about 54 percent. Brownfield investments are common among Chinese firms buying existing companies with access to technology, natural resources, or channels of distribution. About 68 percent (\$205 billion) of Chinese OFDI is non-financial. Table 1 shows the sectoral distribution of FDI from China.

### **Insert Table 1 About Here**

The industrial distribution of Chinese OFDI has become more diversified in recent years. In terms of the stock shares of OFDI between 2004 and 2008, the leasing and business sector remains strong. The share of finance OFDI increased from 17 percent in 2006 to 20 percent in 2008, and the share of the mining sector dropped slightly from 20 percent in 2006 to about 12 percent in 2008 (see Figure 2). Thus, Chinese firms investing abroad are doing more than merely seeking resources.

### **Insert Figure 2 About Here**

In terms of geographic locations, China's OFDI is still concentrated in Asian regions, especially Hong Kong, Taiwan, and Southeast Asia. Asian countries account for 78 percent of China's OFDI, Africa 9.8 percent, Latin America 6.6 percent, Europe 1.6 percent, and North America 0.6 percent. It appears that Chinese firms continue to serve the American market via exports, rather than by market-seeking investments. For the geographic distribution of Chinese OFDI, see Tables 2 and 3.

### **Insert Table 2 and 3 About Here**

The history of Chinese FDI parallels that of China's gradual economic globalization since 1978. In 2002, the government implemented a "going global" policy to promote internationalization. State-owned enterprises (SOEs) dominate most Chinese OFDI. These firms often have monopoly power in the domestic market and enjoy a favorable regulatory environment (Morck et al. 2008). Because SOEs are government owned, specific overseas investments may be political, leading some countries to resort to protectionism.

As Chinese firms gain more experience in international markets, they will learn to adapt and absorb management competencies. Both the tangible and intangible resources will enhance the absorptive capacity and utilization of know-how by Chinese firms. Although some Chinese investments will result in failure, the performance of Chinese firms should improve over time.

## **5. Empirical Results**

To test the Chinese OFDI gravity model, we estimated a number of empirical specifications, allowing for an investigation of the robustness of our main findings. We also used multiple conceptualizations of the dependent variables, looking at the amount spent on specific investments, the number of investments, and the decision to invest. We captured the non-linear effects using the interactions.

### ***5.1 Results for Outward FDI and the Number of Investment Projects per Year***

Tables 4 and 5 report the gravity model estimation results for equation (5) for 103 host countries during the 2003-2007 period using the amount of foreign direct investment from China and the number of projects initiated each year, respectively, as the dependent variables. Columns (1)-(4) in both tables use

the basic specifications in equation (2), whereas columns (5)-(8) are based on equation (3). Column 1 shows the estimation results for the benchmark gravity model equation (5).

In Tables 4 and 5, columns 3, 4, 7, and 8 capture the main hypothesized effect. Deconstructing trade into imports and exports, the models consistently show no significant effect for exports on OFDI, but a significant and negative effect for imports on OFDI. That is, an increase in imports from a host country to China is likely to have a positive impact on OFDI. In other words, host markets exporting to China are more likely to receive direct investment from China.

#### **Insert Table 4 & 5 About Here**

Looking at the trade variables, an increase in imports from a host country to China is associated with an increase in both the amount of FDI and the number of investment projects to a given country per year. This is consistent with the hypothesis that imports and FDI are complementary and horizontal FDI dominates vertical FDI. Import-platform FDI is the main component of the horizontal FDI from China.

A 1 percent increase in China's imports is associated with a 0.15 percent increase in outward FDI, when the volume of OFDI is the dependent variable (Table 4, column 3). When the number of projects is the dependent variable, a 1 percent increase in China's imports is associated with a 0.026 percent increase in outward FDI (Table 5).

In addition, Tables 4 and 5 show that host country GDP, China's GDP, a common language, and host country size have a positive and significant effect on the amount of Chinese outward FDI, whereas the distance between China and the host country negatively affects investment. Sharing a common border does not significantly increase the amount of OFDI from China. However, it does have a positive and significant effect on the number of investment projects that are undertaken.

There is modest evidence in favor of the hypothesis that relatively more favorable credit conditions in a foreign country, as measured by an increase in the interest-rate differential, tend to provide an incentive for Chinese firms to invest. This effect is insignificant for the number of projects.

Chinese firms tend to invest more in countries with similar levels of inflation and similar levels of technological development as measured by Internet penetration.

The evidence is very strong and robust across multiple specifications that Chinese firms tend to invest less in countries where the proportion of skilled-to-unskilled labor is relatively larger than the same ratio in China. Chinese firms also start significantly fewer investment projects per year in countries with a higher proportion of skilled-to-unskilled labor.

Tables 6 and 7 are based on Equation (7) for Chinese OFDI and the number of investment projects from China to a given country started each year. The interaction terms are introduced to examine the non-linearity. Even taking the interaction effects into account, the results for trade remain the same: imports are positive and significant and exports are not significant.

#### **Insert Table 6 & 7 About Here**

Capital mobility is significant in Table 6 and Table 7 when we consider the interaction terms, implying that capital mobility is an important factors associated with outward FDI.

The exchange-rate change and exports are strongly and negatively associated with outward FDI (Table 6, column 1 and 3), implying that a 1 percent increase in China's exports with an exchange-rate change is associated with a 0.56 percent decrease in China's outward FDI.

Chinese exchange-rate was basically fixed and quite stable relative to the dollar during the 2003-2007 period. Our results show that the exchange-rate change variable (ER Change) is insignificant in Table 4, Table 5, and Table 7, but significant in Table 6 with pooled data and interaction terms.

The results show that an appreciation of Chinese currency against other currencies will positively impact outward FDI and a depreciation of Chinese currency will negatively affect outward FDI (Table 6 and Table 7).

The interest-rate differential between China and the host country is positively associated with outward FDI, though the effect is very small (Table 4, Table 6, and Table 7).

### ***5.2 Results for Decision to Invest***

A firm's decision to enter a host market via outward FDI is modeled using a probit regression. Columns 2, 3, 4, 6, 7, and 8 of Table 8 consistently show the same positive and significant relationship between imports and outward FDI, but again there is no effect of exports on the non-interacting terms.

### **Insert Table 8 About Here**

Host country GDP, total GDP, language, and area have positive effects on a firm's decision to engage in OFDI. GDP similarity and distance have a negative effect on a firm's entry decision. In other words, the more similar a country's GDP is to that of China or the closer the distance between China and the OFDI host country, the less likely Chinese enterprises will enter the country via OFDI.

Other macroeconomic variables – the interest-rate differential, inflation, and an exchange-rate appreciation – have positive impacts on a firm's entry decision. A similarity in the openness of capital has a negative coefficient. A positive coefficient on the interactive term between skilled-to-unskilled labor and capital openness suggests that the negative effect of skilled-to-unskilled labor on a firm's decision to invest is less negative for countries with higher levels of capital openness. In terms of the absolute magnitude of the effects of these macroeconomic variables on firm entry decisions, we find that an exchange-rate appreciation has the strongest effect on a firm's entry decision.

## **6. Conclusions**

To sum: we examine Chinese outward FDI to 103 host countries during the 2003-2007 period based on firm-level panel data using multiple econometric-based, augmented gravity model conceptualizations. Overall, we find empirical evidence consistent with the general notion that macroeconomic variables do matter in determining outward FDI. The models are largely consistent in their findings and can stand the test of multiple econometric diagnostics, displaying a high level of robustness.

Our finding suggest that OFDI from China is horizontal based and in support of Chinese imports. A 1% change in imports from China will lead to a 0.15% change in Chinese OFDI. We also find that an appreciation of the Chinese exchange rate will have a strong influence on firm entry decisions.

Another vexing theoretical and policy question is the link between OFDI and exchange rate and trade. The Chinese RMB is generally considered to be undervalued (as of the writing of this article, Sept.,

2010), thereby helping Chinese producers/exporters, coupled with the Chinese trade surplus, particularly with the US, have reached critical levels to gain the attention of legislative bodies.

The empirical results suggest that a change in the Chinese exchange rate can have an effect on outward FDI, as demonstrated with the pooled data and in the interaction terms. Specifically, an appreciation of Chinese currency against the currency of another country has a positive effect on outward foreign direct investment. Exports coupled with the interaction term of an exchange-rate appreciation will have a negative effect on outward FDI.

On the policy front, the article suggests that further appreciation and outward expansion of Chinese firms will likely be associated with reduced Chinese trade surplus. Appreciation will directly influence trade by making Chinese exports more expensive and imports less so. But furthermore, by accelerating the expansion of OFDI, it will also feed more imports into a country hungry for resources, international business know-how, and technology.

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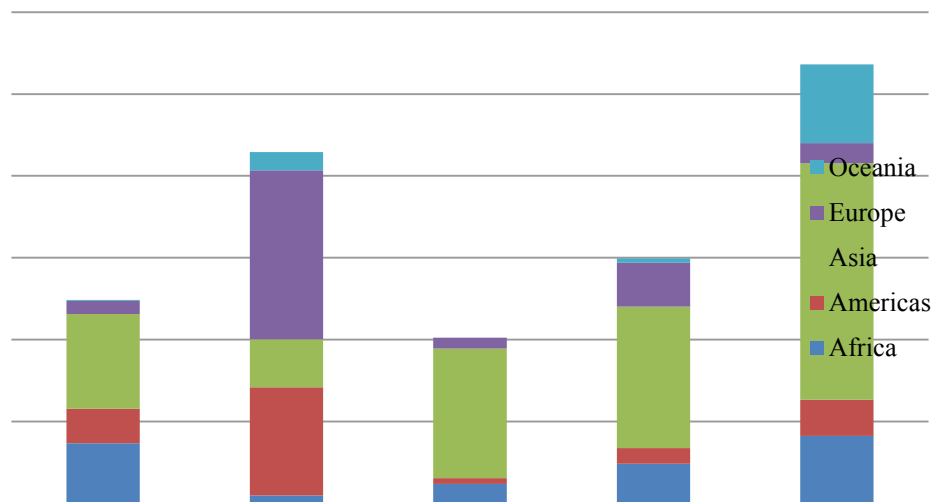
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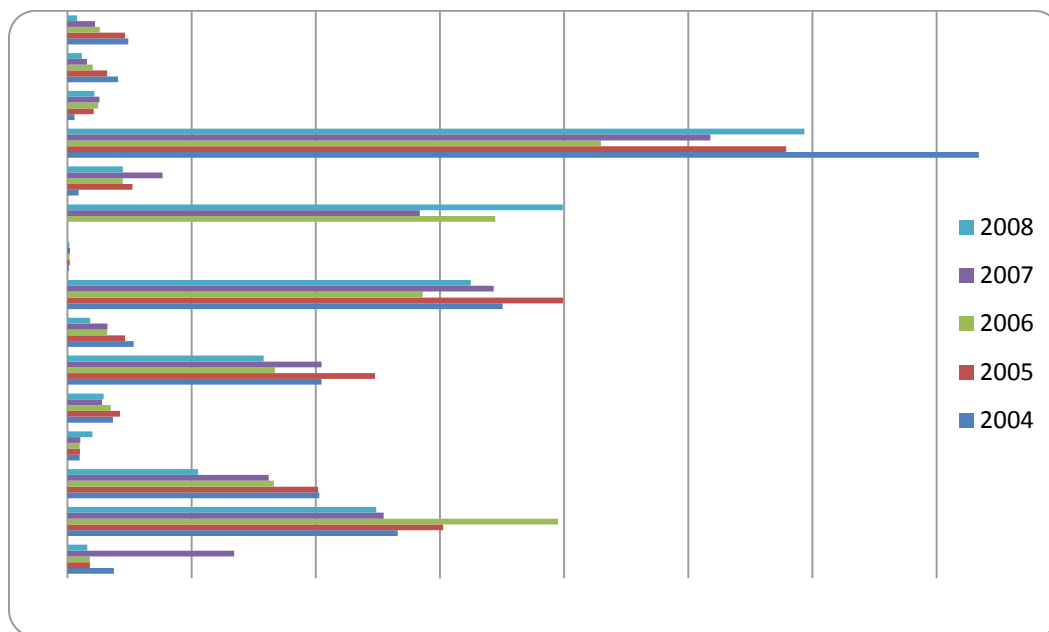
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**Figure 1. China's Annual OFDI Stock (hundred thousand US dollars)**



**Figure 2. Annual Sectoral Share of OFDI (percentage)**

**Table 1. Industry Composition of China's OFDI Stock, 2003-2007**

Rank	Industrial Sector	Average Amount of OFDI per Project	Total Volume of OFDI	Number of Projects	Share of Total Volume
1	Medical Devices	100.00	240309.50	2	0.2806
2	Chemicals	1783.22	201213.10	9	0.2350
3	Automotive OEM	2959.05	156829.40	53	0.1831
4	Textiles	147.21	51534.00	25	0.0602
5	Coal, Oil, and Natural Gas	4790.79	44684.50	42	0.0522
6	Plastics	68.61	29421.00	4	0.0344
7	Communications	451.36	21712.00	99	0.0254
8	Business Services	108.53	16049.00	19	0.0187
9	Alternative/Renewable Energy	1607.61	14468.50	9	0.0169
10	Biotechnology	448.00	12629.50	1	0.0147
11	Electronic Components	187.47	11963.00	17	0.014
12	Transportation	4684.91	10167.20	11	0.0119
13	Building and Construction Materials	1403.28	8346.42	9	0.0097
14	Semiconductors	20.00	4881.00	1	0.0057
15	Metals	3586.71	4607.40	67	0.0054
16	Health Care	199.29	4336.20	7	0.0051
17	Space and Defense	130.00	3680.40	1	0.0043
18	Consumer Products	64.56	3187.07	9	0.0037
19	Financial Services	225.72	3068.00	53	0.0036
20	Automotive Components	179.25	2151.00	12	0.0025
21	Business Machines and Equipment	225.58	2062.00	37	0.0024
22	Minerals	1535.80	1985.40	3	0.0023
23	Non-Automotive Transport OEM	141.81	1978.00	14	0.0023
24	Food and Tobacco	191.75	1395.00	16	0.0016
25	Paper, Printing, & Packaging	395.60	1201.00	5	0.0014
26	Industrial Machinery, Equipment, and Tools	139.88	744.70	31	0.0009
27	Consumer Electronics	452.33	581.00	48	0.0007
28	Real Estate	2674.64	20.00	11	0.0006
29	Beverages	295.00	448.00	2	0.0005
30	Wood Products	2033.44	406.69	5	0.0005
31	Pharmaceuticals	240.20	274.43	5	0.0003
32	Leisure and Entertainment	93.09	200.00	8	0.0002
33	Software and IT Services	187.73	130.00	26	0.0002
34	Aerospace	113.00	113.00	1	0.0001
	Total	31865.42	856370.72	662	100

Source: Authors' calculations.



<b>Table 2. Outward FDI and Number of Projects by Continent and Year</b>						
	2003	2004	2005	2006	2007	2003-2007
<b>A. Average Outward FDI Per Project</b>						
All Countries	289.22 (408.37)	579.88 (1877.20)	219.89 (584.58)	299.20 (509.85)	470.46 (976.15)	368.17 (971.83)
Africa	460.40 (463.90)	99.00 (99.27)	171.80 (136.63)	484.46 (604.92)	413.17 (695.12)	340.99 (492.07)
Americas	418.98 (757.46)	1319.58 (2618.11)	83.90 (131.36)	120.22 (157.65)	244.18 (292.14)	393.16 (1096.88)
Asia	289.56 (356.55)	209.70 (361.19)	465.70 (916.93)	479.80 (673.20)	721.66 (1180.73)	446.22 (787.51)
Europe	88.42 (85.44)	937.55 (3007.83)	36.65 (48.51)	157.57 (349.37)	77.82 (126.43)	221.01 (1192.69)
Oceania	71.70 (0.00)	556.90 (131.66)	- -	130.30 (170.70)	2404.25 (3146.41)	893.51 (1662.23)
<b>B. Total Volume of Outward FDI</b>						
All Countries	12436.87	21455.5	10114.81	14959.76	26816.13	85783.07
Africa	3683.20	495.00	1202.60	2422.31	4131.65	11934.76
Americas	2094.90	6597.90	335.60	961.80	2197.60	12187.80
Asia	5791.27	2935.80	7916.87	8636.40	14433.26	39713.60
Europe	795.80	10313.00	659.74	2678.65	1245.11	15692.31
Oceania	71.70	1113.8	0.00	260.60	4808.50	6254.60
<b>C. Total Number of Projects</b>						
All Countries	104	97	137	128	196	662
Africa	11	5	16	7	14	53
Americas	14	19	14	23	29	99
Asia	58	42	59	65	80	304
Europe	18	28	48	30	68	192
Oceania	3	3	0	3	5	14

Notes: The first row in each panel summarizes the average value of outward FDI, the total value of outward FDI, and the total number of projects from China to all countries in the sample. Rows 2-5 of each panel present the average value of OFDI, the total value of OFDI, and the total number of projects from China to each continent. The standard deviations are reported in parentheses. The last column summarizes the corresponding statistics for the period from 2003 to 2007. The value of investment is measured in hundred thousand US dollars. The sample consists of 103 countries, 22 of which are in Africa, 14 in the Americas, 37 in Asia, 27 in Europe, and 3 in Australia and Oceania. A full list of countries is provided in Appendix A.

<b>Table 3. Proportions of Outward FDI and Number of Projects by Continent and Year</b>						
	2003	2004	2005	2006	2007	2003-2007
<b>A. Volume of Outward FDI</b>						
All Countries	12436.87	21455.5	10114.81	14959.76	26816.13	85783.07
Africa	29.62	2.31	11.89	16.19	15.41	13.91
Americas	16.84	30.75	3.32	6.43	8.20	14.21
Asia	46.57	13.68	78.27	57.73	53.82	46.30
Europe	6.40	48.07	6.52	17.91	4.64	18.29
Oceania	0.58	5.19	0.00	1.74	17.93	7.29

B. Number of Projects						
All Countries	104	97	137	128	196	662
Africa	10.58	5.16	11.68	5.47	7.14	8.01
Americas	13.46	19.59	10.22	17.97	14.80	14.96
Asia	55.77	43.30	43.07	50.78	40.82	45.92
Europe	17.31	28.87	35.04	23.44	34.69	29.00
Oceania	2.89	3.09	0.00	2.34	2.55	2.12

Notes: The first rows in each panel summarize the total value of investment and the total number of projects from China to all countries in the sample. Rows 2-5 in each panel present the percentages of outward FDI and projects to each continent. The last column summarizes the statistics for the period from 2003 to 2007. The sample consists of 103 countries, 22 of which are in Africa, 14 in the Americas, 37 in Asia, 27 in Europe, and 3 in Australia and Oceania. A full list of countries is provided in Appendix A.

**Table 4. Gravity Equation for OFDI: Pooled OLS**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Host GDP	0.411*** (8.62)	0.375*** (7.58)	0.284*** (2.36)	0.248** (2.05)				
China GDP	0.698* (1.83)	0.728* (1.91)	0.285 (0.79)	0.459 (1.11)				
GDP Total					0.501*** (6.70)	0.465*** (6.15)	0.358*** (2.70)	0.348*** (2.62)
GDP Sim					-3.96 (-1.37)	-3.83 (-1.32)	-4.008 (-1.39)	-4.598 (-1.57)
Language	2.762*** (4.61)	1.826*** (3.17)	0.999 (1.59)	1.027* (1.65)	2.785*** (4.64)	1.865*** (3.22)	1.028 (1.63)	1.037* (1.65)
Border	0.600 (1.54)	0.198 (0.48)	0.194 (0.48)	0.209 (0.52)	0.565 (1.43)	0.18 (0.43)	0.137 (0.33)	0.160 (0.39)
Distance	-0.663*** (-2.93)	-0.811*** (-3.51)	-0.724*** (-3.26)	-0.731*** (-3.32)	-0.655*** (-2.89)	-0.797*** (-3.44)	-0.723*** (-3.25)	0.726*** (-3.29)
Area	0.357*** (6.13)	-0.581* (-1.89)	-0.602** (-2.02)	-0.624** (-2.08)	0.349*** (5.95)	-0.568** (-1.85)	-0.606** (-2.03)	-0.626** (-2.10)
Area <sup>2</sup>		0.041*** (3.00)	0.038*** (2.89)	0.040*** (2.97)		0.04*** (2.95)	0.038*** (2.89)	0.039*** (2.96)
ER Change			0.400 (0.75)				0.370 (0.68)	
Exports			0.053 (0.49)	0.077 (0.72)			0.052 (0.48)	0.080 (0.74)
Imports			0.156** (2.34)	0.158** (2.39)			0.162** (2.50)	0.161** (2.51)
IDiff			0.004 (1.08)	0.007** (1.92)			0.004 (1.11)	0.007* (1.95)
InflationSim			0.001*** (3.76)	0.001*** (4.18)			0.001*** (4.03)	0.001*** (4.34)
SU Ratio			-0.201***	-0.216***			-0.203***	-0.232**

			(-2.62)	(-2.80)			(-2.76)	(-3.11)
KAOPEN Sim			-0.001	-0.001			-0.001	-0.001
			(-1.20)	(-1.22)			(-1.05)	(-1.08)
Internet Sim			0.000***	0.000***			0.000***	0.000***
			(2.91)	(2.61)			(3.09)	(3.00)
ER Appreciation				0.880*				0.865*
				(1.79)				(1.74)
ER Depreciation				-2.863**				-2.809**
				(-2.20)				(-2.21)
Adjusted R <sup>2</sup>	0.251	0.262	0.278	0.284	0.252	0.263	0.279	0.285

Notes to Tables 4 and 6: The t-statistics are reported in parentheses; \*, \*\*, and \*\*\* denote coefficients significant at the 10, 5, and 1% levels respectively, based on HAC robust standard errors; The dependent variable is China's outward FDI to 103 countries during the 2003-2007 period. A full list of countries is provided in Appendix A.

**Table 5. Gravity Equation for the Number of Projects: Pooled OLS**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Host GDP	0.179*** (13.01)	0.178*** (12.98)	0.163*** (5.23)	0.161*** (5.05)				
China GDP	0.163* (1.79)	0.164* (1.79)	0.039 (0.41)	0.052 (0.53)				
GDP Total					0.257*** (10.96)	0.261*** (11.13)	0.234*** (6.34)	0.232*** (6.27)
GDP Similarity					-3.905*** (-4.80)	-4.198*** (-5.07)	-4.237*** (-5.12)	-4.301*** (-5.15)
Language	0.805*** (6.11)	0.83*** (6.23)	0.612*** (4.32)	0.615*** (4.35)	0.852*** (6.51)	0.892*** (6.65)	0.682*** (4.70)	0.683*** (4.73)
Border	0.306*** (3.12)	0.314*** (3.23)	0.304*** (3.12)	0.306*** (3.14)	0.251** (2.45)	0.258** (2.55)	0.242** (2.41)	0.245** (2.45)
Area	0.068*** (5.13)	0.071*** (5.30)	0.05*** (3.59)	0.050*** (3.61)	0.064*** (4.78)	0.068*** (5.06)	0.049*** (3.61)	0.049*** (3.62)
Distance	-0.143*** (-2.69)	1.028 (1.32)	0.783 (0.98)	0.742 (0.91)	-0.143*** (-2.65)	1.555** (1.97)	1.391* (1.69)	1.311 (1.56)
Distance <sup>2</sup>		-0.068 (-1.52)	-0.053 (-1.14)	-0.050 (-1.08)		-0.098** (-2.18)	-0.088* (-1.86)	-0.083 (-1.74)
ER Change			0.113 (1.30)				0.066 (0.67)	
Exports			0.023 (0.81)	0.025 (0.88)			0.015 (0.55)	0.019 (0.70)
Imports			0.026* (1.89)	0.026* (1.90)			0.037*** (2.79)	0.036*** (2.80)
IDiff			0.004 (0.76)	0.001 (1.27)			0.0005 (0.83)	0.001 (1.61)
Inflation Sim			0.0001 (1.55)	0.0001 (1.61)			0.0002** (2.05)	0.0002** (2.22)
SU Ratio			-0.054***	0.055***			-0.045**	-0.049***

				(-2.72)	(-2.76)		(-2.44)	(-2.59)
KAOPEN Sim				-0.0003	-0.0003		-0.0001	-0.0001
				(-1.33)	(-1.33)		(-0.67)	(-0.68)
Internet Sim				0.000***	0.000***		0.000***	0.000***
				(3.61)	(3.45)		(3.60)	(3.43)
ER Appreciation					0.149**			0.130
					(2.07)			(1.57)
ER Depreciation					-0.135			-0.350
					(-0.31)			(-0.90)
Adjusted R <sup>2</sup>	0.409	0.410	0.421	0.421	0.429	0.433	0.442	0.442

Notes to Tables 5 and 7: The t-statistics are reported in parentheses; \*, \*\*, and \*\*\* denote coefficients significant at the 10, 5, and 1% levels respectively, based on HAC robust standard errors; The dependent variable is the number of outward FDI projects from China to 103 countries during the 2003-2007 period. A full list of countries is provided in Appendix A.

**Table 6. Gravity Equation for OFDI with Interaction Terms: Pooled OLS**

	(1)	(2)	(3)	(4)
Host Country GDP	0.234*	0.207*		
	(1.92)	(1.67)		
China GDP	0.358	0.467		
	(0.88)	(1.12)		
GDP Total			0.333**	0.331**
			(2.43)	(2.41)
GDP Similarity			-4.801*	-5.590*
			(-1.68)	(-1.91)
Language	0.915	0.852	0.937	0.854
	(1.46)	(1.37)	(1.49)	(1.37)
Border	0.105	0.139	0.046	0.082
	(0.26)	(0.35)	(0.11)	(0.20)
Distance	-0.805***	-0.784***	-0.801***	-0.774***
	(-3.66)	(-3.54)	(-3.65)	(-3.50)
Area	-0.713**	-0.732**	-0.720**	-0.737**
	(-2.36)	(-2.41)	(-2.38)	(-2.44)
Area <sup>2</sup>	0.044***	0.045	0.044***	0.045***
	(3.28)	(3.33)	(3.28)	(3.32)
ER Change	3.248**		3.248**	
	(2.46)		(2.34)	
Exports	0.099	0.149	0.100	0.155
	(0.90)	(1.28)	(0.91)	(1.35)
Imports	0.156**	0.157**	0.161**	0.162**
	(2.35)	(2.39)	(2.50)	(2.52)
IDiff	0.008**	0.010***	0.008**	0.010***
	(2.35)	(2.94)	(2.48)	(2.99)
Inflation Sim	0.001***	0.001***	0.001***	0.001***
	(3.06)	(3.55)	(3.18)	(3.64)
SURatio	-0.176**	-0.164**	-0.176**	-0.183**

KAOPEN Sim	(-2.11) -0.004***	(-2.08) -0.004***	(-2.31) -0.004***	(-2.38) -0.004***
Internet Sim	(-2.96) 0.000***	(-3.00) 0.000**	(-2.86) 0.000***	(-2.90) 0.000**
Exports*ER Change	(2.61) -0.565**	(2.15)	(2.80) -0.565**	(2.37)
IDiff*SU Ratio	(-2.17) -0.016**	(-2.10) -0.017**	(-2.10) -0.017**	-0.018***
IDiff*KAOPEN	(-2.26) -0.001***	(-2.45) -0.001**	(-2.41) -0.001***	(-2.60) -0.001**
SURatio*KAOPEN	(-2.57) 0.001**	(-2.40) 0.001**	(-2.63) 0.001**	(-2.48) 0.001**
ER Appreciation	(2.06)	(2.09) 3.728***	(2.06)	(2.08) 3.691***
ER Depreciation		(3.01) -3.802		(2.95) -4.470
Exports*ER Appr		(-0.86) -0.581**		(-1.03) -0.576**
Exports*ER Depr		(-2.20) -0.169		(-2.16) -0.291
Adjusted R <sup>2</sup>	0.288	(0.23) 0.291	0.290	(0.40) 0.294

**Table 7. Gravity Equation for Number of Projects with Interaction Terms: Pooled OLS**

	(1)	(2)	(3)	(4)
Host Country GDP	0.154*** (4.81)	0.151*** (4.66)		
China GDP	0.023 (0.24)	0.033 (0.34)		
GDP Total			0.229*** (6.04)	0.229*** (6.05)
GDP Similarity			-4.384*** (-5.25)	-4.574*** (-5.48)
Language	0.607*** (4.26)	0.578*** (3.99)	0.681*** (4.67)	0.647*** (4.38)
Border	0.305*** (3.10)	0.312*** (3.18)	0.241** (2.38)	0.249** (2.48)
Area	0.053*** (3.86)	0.052*** (3.72)	0.052*** (3.80)	0.050*** (3.60)
Distance	0.526 (0.63)	0.500 (0.59)	1.136*** (1.34)	1.090 (1.26)
Distance <sup>2</sup>	-0.038 (-0.79)	-0.036 (-0.74)	-0.073 (-1.51)	-0.070 (-1.42)
ER Change	-0.065 (-0.15)		-0.073 (-0.15)	

Exports	0.031 (1.10)	0.045 (1.50)	0.025 (0.89)	0.042 (1.43)
Imports	0.027** (1.98)	0.027** (1.98)	0.038*** (2.89)	0.038*** (2.98)
IDiff	0.001 (1.30)	0.001* (1.81)	0.001* (1.76)	0.002** (2.48)
Inflation Sim	0.0001 (1.17)	0.0001 (1.49)	0.0001 (1.51)	0.0001** (1.96)
SURatio	-0.042*** (-2.07)	-0.041** (-1.97)	-0.033* (-1.73)	-0.034* (-1.72)
KAOPEN Sim	-0.001** (-2.36)	-0.001** (-2.31)	-0.001** (-2.03)	-0.001** (-2.00)
Internet Sim	0.000*** (3.26)	0.000*** (2.71)	0.000*** (3.04)	0.000*** (2.34)
Exports*ER Change	0.036 (0.42)		0.029 (0.32)	
IDiff*SU Ratio	-0.002 (-1.39)	-0.003 (-1.47)	-0.004** (-2.10)	-0.004** (-2.22)
IDiff*KAOPEN	-0.0001 (-1.49)	-0.0001 (-1.35)	-0.0001 (-1.35)	-0.0001 (-1.21)
SURatio*KAOPEN	0.0003* (1.68)	0.0003 (1.62)	0.0003* (1.65)	0.0003 (1.61)
ER Appreciation		0.212 (0.55)		0.203 (0.47)
ER Depreciation		-1.895 (-1.51)		-2.386** (-2.10)
Exports*ER Appr		-0.011 (-0.13)		-0.011 (-0.13)
Exports*ER Depr		0.282 (1.31)		0.324 (1.61)
Adjusted R <sup>2</sup>	0.423	0.423	0.423	0.448

**Table 8. Gravity Equation for OFDI Dummy: Probit**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Host GDP	0.119*** (8.42)	0.095*** (2.85)	0.084** (2.49)	0.078** (2.32)				
China GDP	0.191** (2.04)	0.122 (1.17)	0.137 (1.29)	0.164 (1.50)				
GDP Total					0.159*** (6.67)	0.130*** (3.34)	0.129*** (3.27)	0.126*** (3.25)
GDP Sim					-1.851* (-1.89)	-1.836* (-1.94)	-2.187** (-2.33)	-2.324** (-2.45)
Language	0.571*** (4.78)	0.557*** (3.80)	0.567*** (3.86)	0.571*** (3.89)	0.567*** (4.87)	0.555*** (3.85)	0.564*** (3.89)	0.566*** (3.90)
Border	-0.052	-0.066	-0.077	-0.065	-0.075	-0.094	-0.109	-0.097**

Area	(-0.55) 0.076***	(-0.70) 0.062***	(-0.80) 0.069***	(-0.68) 0.071***	(-0.78) 0.074***	(-0.99) 0.061***	(-1.13) 0.068***	(-1.01) 0.068***
Distance	(4.34) -0.192***	(3.36) -0.175***	(3.71) -0.187***	(3.77) -0.182***	(4.21) -0.189***	(3.32) -0.123***	(3.60) -0.185***	(3.63) -0.179***
ER Change	(-3.23)	(-2.95)	(-3.13)	(-3.10)	(-3.11)	(-2.89)	(-3.05)	(-3.01)
Exports		0.175 (1.30)	0.617* (1.72)			0.171 (1.26)	0.581 (1.59)	
Imports		0.008 (0.23)	0.018 (0.55)	0.022 (0.69)		0.011 (0.33)	0.022 (0.68)	0.027 (0.83)
IDiff		0.029* (1.74)	0.031* (1.81)	0.032* (1.88)		0.030* (1.85)	0.032* (1.92)	0.033** (1.97)
Inflation Sim		0.002 (1.42)	0.003** (2.04)	0.005*** (2.66)		0.002 (1.51)	0.003** (2.10)	0.005*** (2.65)
SU Ratio		0.001* (1.90)	0.001** (2.06)	0.001** (2.17)		0.001* (1.71)	0.001* (1.81)	0.001* (1.77)
KAOPEN Sim		-0.017 (-0.80)	-0.007 (-0.32)	-0.009*** (-0.42)		-0.019 (-0.94)	-0.011 (-0.50)	-0.015 (-0.70)
Internet Sim		-0.0002 (-0.85)	-0.001** (-2.02)	-0.001** (-2.07)		-0.0001 (-0.54)	-0.001** (-1.98)	-0.001** (-2.05)
Exports*ER Change		0.000** (2.34)	0.000** (2.22)	0.000** (2.15)		0.000** (2.34)	0.000** (2.22)	0.000** (2.26)
IDiff*SU Ratio			-0.085 (-1.21)				-0.077 (-1.08)	
IDiff*KAOPEN			-0.004* (-1.87)	-0.005** (-2.16)			-0.005** (-2.09)	-0.005** (-2.34)
SURatio*KAOPEN			-0.0001* (-1.65)	-0.0001 (-1.55)			-0.0001* (-1.79)	-0.0001* (-1.73)
ER Appreciation			0.0003* (1.69)	0.0003* (1.77)			0.0003* (1.80)	0.0004* (1.90)
ERDepreciation				0.399** (2.50)				0.395** (2.45)
Adjusted R <sup>2</sup>	0.231	0.244	0.254	0.258 (-1.34)	0.234	0.247	0.258	0.262 (-1.27)

Notes: The t-statistics are reported in parentheses; \*, \*\*, and \*\*\* denote coefficients significant at the 10, 5, and 1% levels respectively, based on HAC robust standard errors; The dependent variable is the dummy variable, which is equal to one if China's outward FDI is positive and zero otherwise. A full list of countries is provided in Appendix A.

**APPENDIX A. List of Countries by Continent**

Africa (22)	Americas (14)	Asia (37)	Europe (27)	Oceania (3)
Algeria	Argentina	Afghanistan	Austria	Australia
Angola	Bolivia	Armenia	Belarus	New Zealand
Botswana	Brazil	Azerbaijan	Belgium	Papua New Guinea
Congo (DRC)	Canada	Bahrain	Bulgaria	
Egypt	Chile	Bangladesh	Croatia	
Ethiopia	Colombia	Cambodia	Czech Republic	
Gabon	Costa Rica	Georgia	Denmark	
Ghana	Ecuador	Hong Kong	France	
Kenya	Guyana	India	Germany	
Madagascar	Mexico	Indonesia	Greece	
Morocco	Peru	Iran	Hungary	
Mozambique	Uruguay	Israel	Ireland	
Niger	USA	Japan	Italy	
Nigeria	Venezuela	Jordan	Latvia	
Rwanda		Kazakhstan	Luxembourg	
Senegal		Kyrgyzstan	Netherlands	
South Africa		Laos	Norway	
Sudan		Macau	Poland	
Tanzania		Malaysia	Portugal	
Uganda		Mongolia	Romania	
Zambia		Myanmar	Slovakia	
Zimbabwe		Oman	Spain	
		Pakistan	Sweden	
		Philippines	Switzerland	
		Qatar	Turkey	
		Russia	UK	
		Saudi Arabia	Ukraine	
		Singapore		
		South Korea		
		Syria		
		Tajikistan		
		Thailand		
		Turkmenistan		
		UAE		
		Uzbekistan		
		Vietnam		
		Yemen		



## APPENDIX B. Definitions of Variables and Data Sources

Variable Name	Definition	Source
Host Country GDP	Log of host country GDP, billion US dollars	IMF IFS
China GDP	Log of China's GDP, billion US dollars	IMF IFS
GDP Total	Log of the sum of China's and foreign country's GDPs	Authors' calculations
GDP Similarity	Similarity of China's and host country's GDP	Authors' calculations: $s_{it} s_{jt} = \frac{GDP_{it} GDP_{jt}}{(GDP_{it} + GDP_{jt})^2}$
Language	A dummy variable, which indicates whether the two countries share a common official language	CEPII Database
Border	A dummy variable, which indicates whether the two countries share a common border	CEPII Database
Area	Log of the area of the host country, square feet	CEPII Database
Distance	Log of the distance between the two countries	CEPII Database
ER Change	Percentage change in the end-of-year nominal exchange rate, national currency per unit of Chinese currency	IMF IFS
Exports	China's exports to host countries, billion US dollars	IMF <i>Direction of Trade Statistics</i>
Imports	Imports from host country to China, billion US dollars	IMF <i>Direction of Trade Statistics</i>
IDiff	The difference between the short-term interest rate in China and that in the host country	IMF IFS
Inflation Sim	Similarity in the CPI inflation rate	IMF IFS + Authors' calculations
SURatio	The ratio of skilled-to-unskilled labor in the host country to that in China, where skilled labor is proxied by the number of those with a tertiary education per 100 people and unskilled labor is measured by the number of those with a primary education per 100 people	World Bank WDI Database
KAOPEN Sim	Chinn and Ito (2008) capital mobility measure	Menzie Chinn's Web site
Internet Sim	Technological development similarity, where technological development is proxied by the number of people with Internet access per 100 people	World Bank WDI Database
ER Appreciation	The variable, which is equal to the exchange-rate change; 1 if the latter is positive and zero otherwise	Authors' calculations
ER Depreciation	The variable, which is equal to the exchange-rate change; 1 if the latter is negative and zero	Authors' calculations

Notes:

IMF IFS denotes International Monetary Fund *International Financial Statistics* online, January 2010.

World Bank WDI Database denotes World Bank *World Development Indicators* database online, January 2010.

CEPII Database is available at <http://www.cepii.fr/>.

Chinn and Ito (2008) measure of capital mobility is available on Menzie Chinn's Web site at <http://www.ssc.wisc.edu/~mchinn/>.

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